IN THE CLAIMS:

1   1. (CURRENTLY AMENDED) A method for a <u>particular</u> file server to allocate a spare

2   disk to replace a failed disk in a network storage system comprising the steps of:

3   identifying a set of spare disks, the set of spare disks attached to a plurality of ~~fil-~~

4   ~~ers~~ <u>file servers</u> of the network storage system;

5   choosing a best spare disk of the set of spare disks, the best spare disk attached to

6   any of the <u>file servers</u> ~~filers~~ of the plurality of ~~filers~~ <u>file servers, the best spare disk cho-</u>

7   <u>sen according to a plurality of user-selectable policies</u>; and

8   claiming ownership of the best spare disk.

1   2. (ORIGINAL) The method of claim 1 further comprising the steps of:

2   choosing, in response to a failure of the step of claiming ownership, a next best

3   spare disk of the spare disks available; and

4   claiming ownership of the next best spare disk.

1   3. (ORIGINAL) The method of claim 2, wherein the step of claiming ownership of the

2   best spare disk further comprises the steps of:

3   setting a first ownership attribute to a file server-owned state; and

4   setting a second ownership attribute to a file server-owned state.

1   4. (CURRENTLY AMENDED) The method of claim 1 wherein the step of choosing the

2   best spare disk further comprises the steps of:

3   selecting one or more disks from the set of spare disks that satisfy one or more

4   <u>hard-coded</u> rules;

5   sorting the one or more disks selected from the set of spare disks according to <u>the</u>

6   <u>plurality of user-selectable</u> ~~a set of ordered~~ policies to identify a highest-ranked disk;

7   choosing a highest-ranked disk as the best spare disk; and

8   choosing, in response to more than one of the one or more disks being highest-

9   ranked, one disk at random, from the more than one of the one or more disks that are

10   highest-ranked, as the best spare disk.

1   5. (CURRENTLY AMENDED) A method of verifying that a plurality of disks in a vol-

2   ume are optimally configured comprising the steps of:

3   identifying all of the disks in the volume;

4   obtaining disk characteristics, respectfully, from all of the disks in the volume;

5   comparing the disk characteristics with a set of policies and characteristics of

6   spare disks; and

7   alerting an administrator if a more optimal configuration <u>of which disks are used</u>

8   <u>in the volume and which disks are spare </u>is possible.

1   6. (CURRENTLY AMENDED) The method of claim 5 further comprising the step of:

2   reconfiguring the disks into a<u>_the</u> more optimal configuration.

1   7. (CURRENTLY AMENDED) A method of selecting a best spare disk for use by a filer

2   in a network storage system including a plurality of filers, and serving an array of disks

3   from a set of spare disks comprising the steps of:

4   selecting one or more disks from the set of spare disks attached to any of the filers

5   of the plurality of filers, said set of disks satisfying one or more <u>hard-coded </u>rules;

6   sorting the one or more disks using a set of ~~ordered~~<u>user-selectable </u>policies;

7   if only one disk is highest-ranked, selecting the one disk that is highest-ranked as

8   the best spare disk; and

9   if a plurality of disks are highest-ranked, selecting one of the disks from the plu-

10   rality of disks that are highest-ranked as the best spare disk.

1   8. (CANCELLED)

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1   9. (CURRENTLY AMENDED) ~~The network storage system of claim 8, wherein the~~

2   ~~means for allocating one or more of the plurality of spare disks further comprises:~~

3   A network storage system including a plurality of spare disks, comprising:

4   means for identifying the plurality of spare disks, the set of spare disks attached to

5   a plurality of file servers of the network storage system;

6   means for selecting a best spare disk from the plurality of spare disks, the best

7   spare disk chosen according to a plurality of user-selectable policies; and

8   means for claiming ownership of the best spare disk.

1   10. (CURRENTLY AMENDED) The network storage system of claim 9, wherein the

2   means for selecting a best spare disk from the plurality of spare disks further comprises:

3   means for selecting a set of disks from the plurality of spare disks that satisfy one or

4   more hard-coded rules;

5   means for sorting the set of disks according to ~~a set of~~ the plurality of user-selectable

6   ~~ordered~~ policies; and

7   means for selecting a highest-ranked disk from the set of disks.

1   11. (CURRENTLY AMENDED)   A computer-readable medium, including program

2   instructions executing on a particular filer, for allocating a replacement disk to the par-

3   ticular filer, the program instructions performing the steps of:

4   identifying a set of spare disks the set of spare disks attached to a plurality of fil-

5   ers of the network storage system;

6   choosing a best spare disk of the set of spare disks the best spare disk attached to

7   any of the plurality of filers, the best spare disk chosen according to a plurality of user-

8   selectable policies; and

9   claiming ownership of the best spare disk.

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1   12. (CURRENTLY AMENDED) The computer-readable medium of claim 11, wherein

2   the step of choosing the best spare disk further comprises the steps of:

3   selecting one or more disks from a set of spare disks that satisfy one or more hard-

4   coded rules;

5   sorting the one or more disks selected from the set of spare disks according to a

6   set of ordered the plurality of user-selectable policies to identify a highest-ranked disk;

7   choosing a highest-ranked disk as the best spare disk; and

8   choosing, in response to more than one of the one or more disks being highest-

9   ranked, one disk at random, from the more than one of the one or more disks that are

10 highest-ranked, as the best spare disk.

1   13. (PREVIOUSLY PRESENTED) A method for allocating a spare disk to replace a

2   failed disk in a network storage system, comprising:

3   maintaining a plurality of volumes in the network storage system, each volume

4   associated with a set of disk storage units;

5   maintaining a plurality of spare disks in the network storage system;

6   choosing a best spare disk of the plurality of spare disks to replace a failed disk,

7   the failed disk associated with any volume of the network storage system; and

8   replacing the failed disk with the best spare disk.

1   14. (PREVIOUSLY PRESENTED) The method as in claim 13, further comprising:

2   establishing at least one file server in the network storage system; and

3   performing the step of choosing a best spare disk by the at least one file server.

1   15. (PREVIOUSLY PRESENTED) The method as in claim 13, further comprising:

2   establishing at least one file server in the network storage system; and

3   performing the step of replacing the failed disk with the best spare disk by the file

4   server.

1   16. (PREVIOUSLY PRESENTED) The method as in claim 13, further comprising:

2   determining the best spare disk by selecting those disks from the plurality of spare

3   disks which meet at least one selected rule.

1   17. (PREVIOUSLY PRESENTED) The method as in claim 13, further comprising:

2   sorting disks in accordance with policies, and assigning a score to each disk as a

3   result of the sorting; and

4   selecting the disk with a highest score as the best spare disk.

1   18. (PREVIOUSLY PRESENTED) The method as in claim 13, further comprising:

2   determining those disks of the plurality of spare disks which meet at least one se-

3   lected rule to form a selected pool of disks;

4   sorting disks of the selected pool of disks in accordance with policies, and assign-

5   ing a score to each disk as a result of the sorting; and

6   selecting the disk with a highest score as the best spare disk.

1   19. (PREVIOUSLY PRESENTED) The method as in claim 13, further comprising:

2   using a random selection process to select the best spare disk in the event that two

3   or more disks appear to be equally the best spare disk.

1   20. (PREVIOUSLY PRESENTED) A method for allocating a spare disk to replace a

2   failed disk in a network storage system, comprising:

3   maintaining a plurality of volumes in the network storage system, each volume

4   associated with a set of disk storage units;

5   maintaining a plurality of spare disks in the network storage system;

6   attempting to determine the best spare disk by selecting those disks from the plu-

7   rality of spare disks which meet at least one rule;

8   replacing the failed disk with the best spare disk;

9   in the event that no spare disk meets the at least one rule, selecting a spare disk

10   which violates the at least one rule as a selected disk; and

11   notifying an administrator that the selected spare disk violates the rule.

1   21. (PREVIOUSLY PRESENTED) A network storage system, comprising:

2   means for maintaining a plurality of volumes in the network storage system, each

3   volume associated with a set of disk storage units;

4   means for maintaining a plurality of spare disks in the network storage system;

5   means for choosing a best spare disk of the plurality of spare disks to replace a

6   failed disk, the failed disk associated with any volume of the network storage system; and

7   means for replacing the failed disk with the best spare disk.

1   22. (PREVIOUSLY PRESENTED) The network storage system of claim 21, further

2   comprising:

3   means for establishing at least one file server in the network storage system; and

4   means for performing the step of choosing a best spare disk by the at least one file

5   server.

1   23. (PREVIOUSLY PRESENTED) The network storage system of claim 21, further

2   comprising:

3   means for establishing at least one file server in the network storage system; and

4   means for performing the step of replacing the failed disk with the best spare disk

5   by the file server.

1   24. (PREVIOUSLY PRESENTED) The network storage system of claim 21, further

2   comprising:

3   means for determining the best spare disk by selecting those disks from the plural-

4   ity of spare disks which meet at least one selected rule.

1   25. (PREVIOUSLY PRESENTED) The network storage system of claim 21, further

2   comprising:

3   means for sorting disks in accordance with policies, and assigning a score to each

4   disk as a result of the sorting; and

5   means for selecting the disk with a highest score as the best spare disk.

1   26. (PREVIOUSLY PRESENTED) The network storage system of claim 21, further

2   comprising:

3   means for determining those disks of the plurality of spare disks which meet at

4   least one selected rule to form a selected pool of disks;

5   means for sorting disks of the selected pool of disks in accordance with policies,

6   and assigning a score to each disk as a result of the sorting; and

7   means for selecting the disk with a highest score as the best spare disk.

1   27. (PREVIOUSLY PRESENTED) The network storage system of claim 21, further

2   comprising:

3   means for using a random selection process to select the best spare disk in the

4   event that two or more disks appear to be equally the best spare disk.

1   28. (PREVIOUSLY PRESENTED) A network storage system, comprising:

2   means for maintaining a plurality of volumes in the network storage system, each

3   volume associated with a set of disk storage units;

4   means for maintaining a plurality of spare disks in the network storage system;

5   means for attempting to determine a best spare disk by selecting those disks from

6   the plurality of spare disks which meet at least one rule;

7   means for replacing the failed disk with the best spare disk;

1   in the event that no spare disk meets the at least one rule, means for selecting a

2   spare disk which violates the at least one rule as a selected disk; and

3   means for notifying an administrator that the selected spare disk violates the rule.

1   29. (PREVIOUSLY PRESENTED) A file server in a network storage system, compris-

2   ing:

3   a storage adapter to connect to a plurality of disk storage units in the network

4   storage system;

5   an operating system to maintain a plurality of volumes, each volume associated

6   with a set of disk storage units, the set of disk storage units selected from the plurality of

7   disk storage units;

8   the operating system maintaining a plurality of spare disks units selected from the

9   plurality of disk storage units;

10   the operating system choosing a best spare disk of the plurality of spare disks to

11 replace a failed disk, the failed disk associated with any volume of the network storage

12 system; and

13   the operating system replacing the failed disk with the best spare disk.

1   30. (PREVIOUSLY PRESENTED) The file server of claim 29, further comprising:

2   the operating system determining the best spare disk by selecting those disks from

3   the plurality of spare disks which meet at least one selected rule.

1   31. (PREVIOUSLY PRESENTED) The file server system of claim 29, further compris-

2   ing:

3   the operating system sorting disks in accordance with policies, and assigning a

4   score to each disk as a result of the sorting; and

5   the operating system selecting the disk with a highest score as the best spare disk.

1   32. (PREVIOUSLY PRESENTED) The file server system of claim 29, further compris-

2   ing:

3   the operating system determining those disks of the plurality of spare disks which

4   meet at least one selected rule to form a selected pool of disks;

5   the operating system sorting disks of the selected pool of disks in accordance with

6   policies, and assigning a score to each disk as a result of the sorting;

7   the operating system selecting the disk with a highest score as the best spare disk.

1   33. (PREVIOUSLY PRESENTED) The file server of claim 29, further comprising:

2   the operating system using a random selection process to select the best spare disk

3   in the event that two or more disks appear to be equally the best spare disk.

1   34. (PREVIOUSLY PRESENTED) A file server in a network storage system, compris-

2   ing:

3   a storage adapter to connect to a plurality of disk storage units in the network

4   storage system;

5   an operating system to maintain a plurality of volumes, each volume associated

6   with a set of disk storage units, the set of disk storage units selected from the plurality of

7   disk storage units;

8   the operating system maintaining a plurality of spare disks units selected from the

9   plurality of disk storage units;

10   the operating system choosing a best spare disk of the plurality of spare disks to

11   replace a failed disk, the failed disk associated with any volume of the network storage

12   system;

13   the operating system attempting to determine a best spare disk by selecting those

14   disks from the plurality of spare disks which meet at least one rule;

15   the operating system replacing the failed disk with the best spare disk;

16   in the event that no spare disk meets the at least one rule, the operating system se-

17   lecting a spare disk which violates the at least one rule as a selected disk; and

18   the operating system notifying an administrator that the selected spare disk vio-

19   lates the rule.

1   35. (PREVIOUSLY PRESENTED) A computer readable media, comprising:

2   said computer readable media containing instructions for execution on a processor

3   for the practice of a method for allocating a spare disk to replace a failed disk in a net-

4   work storage system, the method having the steps of,

5   maintaining a plurality of volumes in the network storage system, each volume

6   associated with a set of disk storage units;

7   maintaining a plurality of spare disks in the network storage system;

8   choosing a best spare disk of the plurality of spare disks to replace a failed disk,

9   the failed disk associated with any volume of the network storage system; and

10   replacing the failed disk with the best spare disk.

1   36. (CANCELLED)

1   37. (NEW) The method of claim 13 wherein the best spare disk is chosen based upon

2   physical proximity to the failed disk.

1   38. (NEW) The method of claim 13 wherein the best spare disk is chosen based upon a

2   comparison of the storage space of the spare disks and the failed disk.

1   39. (NEW) The method of claim 13 wherein the best spare disk is chosen based upon a

2   comparison of the speed of the spare disks and the failed disk.

1   40. (NEW) A computer implemented method for allocating a spare storage device to

2   replace a failed storage device in a network storage system, comprising:

3   identifying a set of spare storage devices in the network storage system; and

4   selecting a particular spare storage device of the set of spare storage devices to re-

5   place the failed storage device, the particular spare storage device selected using a prox-

6   imity policy in which preference is given to a spare storage device physically closest to

7   the failed storage in the network storage system.

1 41. (NEW) The method of claim 40 wherein the proximity policy gives preference to a

2 spare storage device on a same shelf as the failed storage device.

1 42. (NEW) The method of claim 40 wherein the proximity policy gives preference to a

2 spare storage device on a same loop as the failed storage device.

1 43. (NEW) The method of claim 40 wherein the proximity policy gives preference to a

2 spare storage device on a same switch as the failed storage device.

1 44. (NEW) The method of claim 40 wherein the proximity policy gives preference to a

2 spare storage device on a same switch as the failed storage device.

1 45. (NEW) A computer implemented method for allocating a spare storage device to

2 replace a failed storage device in a network storage system, comprising:

3   identifying a set of spare storage devices in the network storage system; and

4   selecting a particular spare storage device of the set of spare storage devices to re-

5 place the failed storage device, the particular spare storage device selected using a size

6 policy in which preference is given to a spare storage device with minimum storage space

7 in excess of the storage space of the failed disk.

1 46. (NEW) A computer implemented method for allocating a spare storage device to

2 replace a failed storage device in a network storage system, comprising:

3   identifying a set of spare storage devices in the network storage system; and

4   selecting a best spare storage device of the set of spare storage devices to replace

5 the failed storage device, the best spare storage device selected using a speed policy in

6 which preference is given to a spare storage device with a speed closest to that of the

7 failed disk.

1   47. (NEW) The method of claim 46 wherein the speed is a rotation speed.

1   48. (NEW) The method of claim 46 wherein the speed is a data read speed.

1   49. (NEW) The method of claim 46 wherein the speed is a data write speed.

1   50. (NEW) A computer readable medium comprising executable program instructions
2   for allocating a spare storage device to replace a failed storage device in a network stor-
3   age system, the executable program instructions adapted for:
4   identifying a set of spare storage devices in the network storage system; and
5   selecting a particular spare storage device of the set of spare storage devices to re-
6   place the failed storage device, the particular spare storage device selected using a prox-
7   imity policy in which preference is given to a spare storage device physically closest to
8   the failed storage in the network storage system.

1   51. (NEW) A computer readable medium comprising executable program instructions
2   for allocating a spare storage device to replace a failed storage device in a network stor-
3   age system, the executable program instructions adapted for:
4   identifying a set of spare storage devices in the network storage system; and
5   selecting a particular spare storage device of the set of spare storage devices to re-
6   place the failed storage device, the particular spare storage device selected using a size
7   policy in which preference is given to a spare storage device with minimum storage space
8   in excess of the storage space of the failed disk.

1   52. (NEW) A computer readable medium comprising executable program instructions
2   for allocating a spare storage device to replace a failed storage device in a network stor-
3   age system, the executable program instructions adapted for:
4   identifying a set of spare storage devices in the network storage system; and

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5   selecting a best spare storage device of the set of spare storage devices to replace

6   the failed storage device, the best spare storage device selected using a speed policy in

7   which preference is given to a spare storage device with a speed closest to that of the

8   failed disk.